Complete Summary

GUIDELINE TITLE

ACR Appropriateness Criteria™ for recurrent lower urinary tract infections in women.

BIBLIOGRAPHIC SOURCE(S)

American College of Radiology (ACR), Expert Panel on Urologic Imaging. Recurrent lower urinary tract infections in women. Reston (VA): American College of Radiology (ACR); 2001. 6 p. (ACR appropriateness criteria). [30 references]

GUIDELINE STATUS

This is the current release of the guideline. It updates a previous version: Segal AJ, Amis ES, Bigongiari LR, Bluth EI, Bush WH, Choyke PL, Fritzsche P, Holder L, Newhouse JH, Sandler CM, Resnick MI, Rutsky EA. Recurrent lower urinary tract infections in women. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):671-6.

All Appropriateness Criteria™ topics are reviewed annually and updated as appropriate.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Recurrent lower urinary tract infections (UTIs)

GUIDELINE CATEGORY

Diagnosis
Evaluation
Screening

CLINICAL SPECIALTY

Family Practice
Internal Medicine
Obstetrics and Gynecology
Radiology
Urology

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of radiologic examinations for recurrent lower urinary tract infections (UTIs) in women

TARGET POPULATION

Women with recurrent lower urinary tract infections (UTIs)

INTERVENTIONS AND PRACTICES CONSIDERED

1. Excretory urography (intravenous pyelogram [IVP])
2. Computed tomography (CT) abdomen/pelvis without/with intravenous (IV) contrast
3. Abdominal plain film (kidneys, ureters, bladder [KUB])
4. Unenhanced helical computed tomography of abdomen
5. Cystography
6. Voiding cystourethrography
7. Retrograde urethrography
8. Barium contrast enema
9. Renal ultrasound
10. Bladder ultrasound
11. Nuclear cystography
12. Pelvic magnetic resonance imaging (MRI)
13. Urethral magnetic resonance imaging
14. Urethral ultrasound

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in the investigation of recurrent lower urinary tract infections (UTIs) in women

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of recent peer-reviewed medical journals, primarily using the National Library of Medicine's MEDLINE database. The developer identified and collected the major applicable articles.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed to reach agreement in the formulation of the Appropriateness Criteria. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by the participants in their own professional setting without influence of the other

members. Voting is conducted using a scoring system from 1-9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty (80) percent agreement is considered a consensus. If consensus cannot be reached by this method, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria and the Chair of the ACR Board of Chancellors.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Clinical Condition: Recurrent Lower UTIs in Women

Radiologic Exam Procedure	Appropriateness Rating	Comments
IVP	6	Not cost effective in this group. May be useful if there is an uncertain history.
CT abdomen/pelvis without/with IV contrast	6	In recurrent and persistent infection, CT may be indicated to exclude structural abnormalities. MRI may be indicated if urethral diverticulum is suspected.
Abdominal plain film (KUB)	4	May be useful in patients when there is a suspicion of calculi.
Unenhanced helical CT	3	May be useful in patients when there is

Radiologic Exam Procedure	Appropriateness Rating	Comments
of abdomen		a suspicion of calculi.
Cystography	2	
Voiding cystourethrography	2	
Retrograde urethrography	2	
Barium contrast enema	2	
Renal ultrasound	2	
Bladder ultrasound	2	
Nuclear cystography	2	
Pelvic MRI	2	
Urethral MRI	2	
Urethral ultrasound	1	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1=Least appropriate 9=Most appropriate		

Abbreviations: IVP, excretory urography/intravenous pyelogram; CT, computed tomography; IV, intravenous; KUB, kidneys, ureters, bladder; MRI, magnetic resonance imaging

Recurrent lower urinary tract infections (UTIs) are usually defined as two or more episodes of such infection occurring in the preceding 12 months. In most cases, such infections are the result of sexual habits and hygiene (e.g., women who are sexually active, especially those using diaphragms and/or spermatocides). In fact, such lower UTIs are commonly referred to as "honeymoon cystitis." A clean-catch or catheterized specimen for culture typically reveals greater than 100,000 organisms per milliliter of urine. The typical infecting organism is Escherichia coli. The route of infection is ascending from the perianal area and vagina via the urethra and into the bladder. In women, it is not at all uncommon for such infections to be severe enough to result in gross hematuria. However, in uncomplicated lower UTIs, there is complete clearing of bacteriuria and hematuria with appropriate antimicrobial therapy. In some cases, single-dose antimicrobial therapy after intercourse or at the onset of irritative voiding symptoms is adequate to control frequent recurrences of cystitis. In patients without underlying risk factors (see Table 1 in the original guideline document), lower urinary tract infections as defined above that do not exceed two episodes per year on average, and that respond promptly to appropriate therapy, imaging is usually not cost-effective.

Uncomplicated recurrent lower UTIs in women must be differentiated from "reinfection," which may indicate causes such as a vesicovaginal or vesicoenteric fistula or a paravesical abscess with fistula to the bladder. Furthermore, "bacterial persistence" is defined as an infection with the same organism, typically from a site within the urinary tract, after the bacteriuria has resolved for at least several days and antimicrobial therapy has ceased. Causes of bacterial persistence include calculi, foreign bodies, urethral or bladder diverticula, infected urachal cyst, and postoperative changes such as a remaining ureteral stump that retains urine and results in stasis. In such patients with frequent recurrences and reinfections with the same bacteria, imaging is indicated to detect a treatable condition and monitor its progress.

Imaging studies should be reserved for women who do not respond promptly to appropriate antimicrobial therapy, those who suffer frequent reinfections (or bacterial persistence), and those with known risk factors. Documented risk factors associated with other than uncomplicated lower UTIs include persistent hematuria, history of pyelonephritis, history of childhood urinary tract infections, flank pain, fever more than 38.5 degrees Celsius, history of urinary calculi or urinary tract obstruction, obstructive voiding symptoms (straining to urinate, feeling of incomplete bladder emptying, etc.), infection with a urea-splitting organism, abnormal renal function studies, neurogenic bladder dysfunction, history of genitourinary surgery, asymptomatic bacteriuria, diabetes mellitus, and analgesic abuse. It should be remembered in all cases of UTI that it is often difficult to distinguish between infections associated with pathology in the upper versus the lower urinary tract. As an example, in a series of 293 patients, the most common presenting symptom in women with reflux nephropathy was lower UTI (72% of cases). The following paragraphs discuss the various imaging examinations that may be useful in evaluating women with recurrent UTIs that fall outside the category of uncomplicated.

Plain film (kidneys, ureters, bladder [KUB]) of the abdomen has long been an important examination for the detection of calculi, bladder wall calcifications, gas in the wall or lumen of the urinary bladder, and/or foreign bodies that may be the etiology of a UTI. When calcifications are seen in the bladder wall, it is often possible to make a correct clinical diagnosis if these findings are viewed in the context of the clinical history, physical examination, appropriate laboratory studies, and further imaging of the remainder of the urinary tract. Bladder wall calcification is typically due to prior infection with schistosomiasis (uncommon in the United States, but very common in other parts of the world), tuberculosis, Cytoxan cystitis, radiation cystitis, or urothelial neoplasm (found in less than 1% of transitional cell carcinomas).

Excretory urography (intravenous pyelogram [IVP]) remains a highly effective modality for evaluating the urinary tract. The study optimally includes thin-section nephrotomography, which will generally detect a renal parenchymal mass such as an abscess that may be a focus of recurrent infection. Ill-defined renal margins may suggest a perirenal inflammatory process best evaluated by computed tomography (CT). However, for evaluation of the collecting system, IVP is virtually unexcelled and will correctly detect the changes of chronic atrophic pyelonephritis, papillary necrosis, subtle urothelial neoplasms, and other changes associated with infections such as pyelitis cystica and leukoplakia. IVP is also useful for excluding congenital anomalies or obstruction of the urinary tract. The bladder phase of the

IVP can usually identify contour abnormalities suggestive of inflammation or neoplasm. Further, the ability of the bladder to empty on voiding can be reasonably assessed. However, when questions remain regarding the integrity of the bladder wall, cystoscopy is always indicated to rule out neoplasm.

Although abdominal plain-film radiography is considered the most cost-effective imaging modality for detecting opaque calculi associated with recurrent urinary tract infection, it may prove inadequate in some cases (e.g., poor definition due to moderate overlying bowel). In such instances, unenhanced helical CT may be used. In many locations, the cost of this examination has been reduced so that it is competitive with that of an IVP. Its benefits include increased accuracy in detecting calculi (spatial resolution and lack of overlying bowel and bone), increased speed of examination, and increased abdominal detail, allowing, in some cases, an alternate diagnosis to explain patients' signs, symptoms, and laboratory findings. As a result, unenhanced CT has been used predominantly for the emergency patient with "renal colic" and/or hematuria. It has also been used to define the severity and extent of upper-tract calculi, sometimes associated with recurrent urinary tract infections. Additionally, CT without and with intravenous contrast has been very helpful and has been described as the "examination of choice" in evaluating of complicated urinary tract infections (e.g., abscess).

Some investigators have advocated the use of renal and pelvic ultrasound (US) combined with KUB as a replacement for IVP. They conclude that young women with recurrent UTIs should have this combination of exams (i.e., US and KUB) as the investigation of choice because it is cost-effective, "non-invasive, inexpensive and acceptable to the patient." Others have supported the continued use of IVP by citing the level of experience required to perform accurate US as well as the operator dependence of this exam. Ultrasound has been shown to be equal to IVP for detecting bladder stones but less sensitive than abdominal x-ray for detecting bladder wall calcifications or distal ureteral stones. Bladder and urethral calcifications have also been detected by CT, but this examination is more costly and should not be used routinely.

Patients with suspected bladder diverticula may be imaged with IVP, cystography, or US. When a bladder diverticulum is at or near a ureteral orifice, voiding cystourethrography (VCUG) should be considered to evaluate the possibility of vesicoureteral reflux. Although used commonly to reduce the dose of radiation in children, nuclear cystography has not been used widely in adults.

Diverticula of the urethra can be evaluated by voiding cystourethrography or retrograde urethrography. Some have also advocated US and magnetic resonance imaging (MRI) for detection. Endovaginal and transperineal sonography has been suggested as a "noninvasive screening technique for female urethral diverticula." It is said to better demonstrate the "spatial relationship of the diverticula to the urethra." MRI is accurate but expensive and should be reserved for those patients in whom there is strong clinical suspicion of a diverticulum and when the more conventional modalities are equivocal.

When performing cystography and urethrography for evaluation of the lower urinary tract, the use of digital radiography has been shown to decrease radiation dose by approximately 90% while maintaining diagnostic accuracy. This is

particularly important in reducing the gonadal radiation dose during the examination of young women.

Enterovesical fistulae are usually caused by diverticulitis (cancer is the second most common cause). Clinical suspicion is frequently raised by the presence of UTI with pneumaturia and/or fecaluria. The diagnosis and localization usually require more than one examination. In one large series, cystoscopy and barium enema were used in 75% of the patients but were positive in only 36% of the patients and 34% of the patients, respectively. IVP was performed in 55% of the patients but was only 12.5% diagnostic; cystography was used 36% of the time and was 44% diagnostic; CT scan was used in 23% of patients and was 60% diagnostic. Colonoscopy, US, upper gastrointestinal/small bowel follow-through, sigmoidoscopy, MRI, and nuclear imaging have very low yields, making them even less cost-effective. The authors conclude that CT, cystoscopy, and oral charcoal are the most effective modalities for diagnosing the presence of a fistula. Yet, after analysis of another large series, the authors conclude that a combination of cystoscopy, cystography, and barium enema "resulted in diagnosis of all patients."

When UTI accompanies neuropathic bladder, cystography or US may demonstrate the morphologic changes of the bladder wall, and VCUG or transrectal sonographic voiding cystourethrography may document neuromuscular dysfunction of the bladder and/or associated sphincters.

Summary

Women with recurrent UTIs should have one or more additional risk factors to justify urologic or radiologic investigation. In such cases, the abdominal plain film, US, IVP, and cystoscopy are the most common and most rewarding examinations for achieving a cost-effective diagnosis, and they continue to be the core examinations for evaluating the lower urinary tract. Abnormalities of the bladder and the urethra can also be shown with cystography and urethrography, respectively. When radiography is used, digital imaging can provide excellent detail at significantly reduced radiation exposure. For the detection of fistulae, contrast enema and CT scan have also been shown to be diagnostic and may supplement cystoscopy and cystography. MRI and nuclear imaging have had a very limited role in the evaluation of women with recurrent lower UTIs.

Anticipated Exceptions

Exceptions to the above guidelines occur when there is clinical confusion regarding the source of recurrent UTI or when risk factors (enumerated above and in Table 1 of the original guideline document) are present. In such cases, appropriate imaging as previously described is indicated.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Appropriate radiologic exam procedures in the investigation of recurrent lower urinary tract infections (UTIs) in women
- When performing cystography and urethrography for evaluation of the lower urinary tract, the use of digital radiography has been shown to decrease radiation dose by approximately 90% while maintaining diagnostic accuracy.
- The use of digital radiography is particularly important in reducing the gonadal radiation dose during the examination of young women.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other coexistent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

American College of Radiology (ACR), Expert Panel on Urologic Imaging. Recurrent lower urinary tract infections in women. Reston (VA): American College of Radiology (ACR); 2001. 6 p. (ACR appropriateness criteria). [30 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1995 (revised 2001)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria™.

GUIDELINE COMMITTEE

ACR Appropriateness Criteria™ Committee, Expert Panel on Urologic Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline. It updates a previous version: Segal AJ, Amis ES, Bigongiari LR, Bluth EI, Bush WH, Choyke PL, Fritzsche P, Holder L, Newhouse JH, Sandler CM, Resnick MI, Rutsky EA. Recurrent lower urinary tract infections in women. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):671-6.

All Appropriateness Criteria™ topics are reviewed annually and updated as appropriate.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

Portable Digital Assistant (PDA): ACR Appropriateness Criteria™ - Anytime, Anywhere (PDA version) is available from the ACR Web site.

Print copies: Available from the American College of Radiology, Department of Quality & Safety, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- American College of Radiology ACR Appropriateness Criteria™ introduction. Reston (VA): American College of Radiology; 6 p. Available in Portable Document Format (PDF) from the ACR Web site.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on May 6, 2001. The information was verified by the guideline developer as of June 29, 2001. This summary was

updated by ECRI on September 7, 2004. The updated information was verified by the guideline developer on October 8, 2004.

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